

SOCIOECONOMIC TRANSITION AND WILDLIFE CONSERVATION IN THE INDIAN TRANS-HIMALAYA¹

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Canis lupus

The founding postulate of the preservationist conservation philosophy — that local human communities cause land degradation and biodiversity loss — is increasingly being questioned for its scientific validity. That this postulate may not hold in many cases is being used, *inter alia*, in support of calls for more inclusive conservation policies in developing countries. Such policies would allow, or even encourage, consumptive human use of natural resources within designated wildlife-protected areas. However, the latter approach again rests upon the assumption that local human communities and their impacts on natural resources are constant. The present paper questions this assumption using a case study from a hitherto isolated region of the Indian Trans-Himalaya. I describe the ongoing socio-economic flux in an agropastoral Buddhist community dependent upon the resources of a protected area, and the impacts of this transition on wildlife conservation. The analysis shows radical changes in the local economy and land use in the last decade, that ultimately proceed from extrinsic factors (market forces, changes in Government policy). Immediate conservation problems have proximately arisen from both extrinsic (uncontrolled tourism) as well as intrinsic (escalation of livestock stocking rate) changes. The analysis underscores the need for conservation policies to be sensitive to the transient nature of local human communities, even in seemingly isolated protected areas.

INTRODUCTION

The thrust of India's conservation policy has been preservationist, wherein emphasis has been placed on minimising or eliminating consumptive human uses within areas designated for protection of wildlife. Despite such an exclusionary official policy, more than 80 % of Indian wildlife reserves are inhabited by local human communities that continue to use the natural resources in them, albeit within state-imposed restrictions (Kothari *et al.* 1989). Such restrictions on traditional resource use following the creation of protected areas are responsible for local hostility and the absence of local support for conservation efforts (Kothari *et al.* 1995, Guha 1997, Saberwal 1997). This

hostility gets further aggravated in the face of serious human-wildlife conflicts in many protected areas, and the subsequent bureaucratic apathy faced by the local people (Guha 1997, Mishra 1997a, Saberwal 1997, Saberwal *et al.* 1994). Not surprisingly then, as in many other developing countries (Prins 1992), the merits of the Indian preservationist approach are being increasingly questioned on social, economic, ethical, political, pragmatic and even ecological grounds. Critics have contended that the preservationist policy has been based on scientifically unsubstantiated assumptions that local human communities cause land degradation and the loss of biodiversity (Saberwal 1996, Guha 1997). There is an increasing call for 'rethinking conservation' and embracing a more inclusive policy, which, in theory, allows for biodiversity conservation alongside local human resource use (e.g. Kothari *et al.* 1995, Saberwal 1996). However, the latter thesis again rests upon an important yet unsubstantiated assumption that views local human communities, their life-styles,

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and the magnitude of their impacts, as static and immune to change (Mishra and Rawat 1998). It is this assumption that is questioned here. The aim is neither to denounce nor advocate the demands for 'democratic' multiple use policies; under the complex sociopolitical situations in most developing countries, strict adherence to either stand will prove counter-productive for wildlife conservation. The purpose of this paper, instead, is to show that irrespective of the official conservation policy (1) local human communities even in the remotest regions of the developing world are undergoing rapid social and land use transition, (2) this transition has potentially important consequences for wildlife conservation, and following from this, (3) conservation policies need to be extremely sensitive to these changes.

Focusing on three agropastoral Buddhist villages (80 households) dependent upon the resources of a protected area, this paper describes the ongoing socio-economic transition in the Spiti region (31° 42' to 32° 58' N lat. and 77° 21' to 78° 35' E long.) of the Indian Trans-Himalaya. Located close to the politically sensitive Sino-Indian border, in difficult mountainous terrain, Spiti remained a remote area with restricted geographical as well as administrative access until 1992. In this paper, I specifically document the socio-economic trends in the region over the last 25 years, and subsequently discuss their consequences for wildlife conservation. The urgent research and management inputs required for conservation both at the local and regional levels are also outlined.

STUDY AREA

The Trans-Himalayan region includes the high altitude plateau of Tibet and the Tibetan marginal mountains, an area of over 2.6 million km². The c. 186,000 km² within India, despite its conservation significance, forms one of the

least represented biogeographic zones in the Indian protected area network (Rodgers and Panwar 1988).

The Spiti region in the Trans-Himalayan Lahaul and Spiti dist. (Himachal Pradesh) spans an area of 12,210 km² in the catchment area of the Spiti river, with a human population of 9,591 (in 1991; Directorate of Economics and Statistics 1996) which is largely Buddhist (Kaushik 1993). Spiti had no wildlife reserves until the last decade. The establishment of the 675 km² Pin Valley National Park (31° 44' to 32° 11' N lat., and 77° 45' to 78° 06' E long.) in 1987, and the 1400 km² Kibber Wildlife Sanctuary (32° 5' to 32° 30' N lat. and 78° 1' to 78° 32' E long.) in 1992, has resulted in 17% of Spiti's land area being designated as wildlife reserve. The protected area boundaries, however, are only nominal, considering they were drawn around existing settlements and villages whose inhabitants continue using these areas for grazing, fuel and fodder collection.

Kibber Wildlife Sanctuary lies in the northern catchment of Spiti and is flanked by Ladakh to the north and Tibet to the east. The Sanctuary, like the rest of the Trans-Himalaya, lies in the rain shadow of the Greater Himalaya, and ranges in altitude from c. 3,600 m to 6,700 m above msl. Temperatures range between -30°C to 3°C in the winter, and between 1°C to 28°C in summer (Rana 1994). Vegetation in the area has been broadly classified as dry alpine steppe (Champion and Seth 1968). The Sanctuary is flanked by 13 villages along its southern boundary inhabited by an agropastoral Buddhist community, whose agricultural activities are restricted to the short growing season between May and September. Barley *Hordeum vulgare* and green pea *Pisum sativum* are the main crops. Livestock includes goat, sheep, cattle, yak, *dzomo* (female hybrid of cattle and yak), donkey and horse. Goat, cattle and *dzomo* are used for both milk and meat. Sheep are used for wool and yaks for ploughing, in

addition to meat. Donkeys are used as draught animals, and raised partly for trade. Horses, apart from being used for religious ceremonies, are raised mainly for trade (Mishra 1997a).

The mammalian fauna of the Sanctuary includes snow leopard *Uncia uncia*, wolf *Canis lupus*, red fox *Vulpes vulpes*, pale weasel *Mustela altaica*, stone marten *Martes foina*, Himalayan mouse hare *Ochotona* sp., bharal *Pseudois nayaur*, and ibex *Capra ibex*.

METHODS

Unpublished archival records of the State Government were scrutinised (see Mishra 1997a for details of sources) for information relating to human population and past literacy rates, livestock population, and developmental changes in the region over the last 25 years. Of the 13 villages surrounding Kibber Wildlife Sanctuary, three, which together comprised 19% of the population living around the park, were selected as samples for the study (for details see Mishra 1997a). This included Kibber, the largest in the area (316 inhabitants), and two small villages nearby, Gete (36) and Tashigang (24). Structured interviews were conducted with at least one member from each household in the three villages, to obtain information regarding present family size and literacy, livestock and land holdings, and past and current agricultural practices. Human and livestock population growth rates (r) were calculated using the exponential growth curve equation ($N_t = N_0 e^{rt}$ where N_t is the population at time t , N_0 is the starting population, and e the base of natural logarithms). Crop yield per unit area was obtained for different crops by interviewing two experienced farmers, and the lower limit of the reported range used to obtain a conservative estimate of crop production. Casual interviews and observations during the course of field work yielded information on tourism and its impacts.

RESULTS

Human population and development

The human population in the thirteen villages bordering Kibber Wildlife Sanctuary increased only marginally (at an annual growth rate of 0.09%) between 1971 and 1991 (1985 people in 1991; data for 1996 not available). Likewise, between 1971 and 1996, the three study villages saw a total population increase of only 6.5%, an average annual growth rate of 0.25% (Mishra 1997a). Children <18 years comprise 49% of the present population of the study villages. Literacy rate has doubled (from 22% to 48%) in the last 25 years. Presently, 31% of the adult males ($n = 91$), and 26% of the adult females ($n = 100$) are literate. In the school-going age group (*c.* 5 to 18 years), there is 97% literacy ($n = 127$). Among other indicators of development, this period has seen an increase in the number of schools and the electrification of all three study villages (Table 1). Two of the three villages, Gete and Tashigang, which earlier had no roads, have been connected by motorable roads.

Agriculture

The number of people per unit of irrigated land has remained nearly constant over the last 25 years (Table 1), with the current average land holding per household at 1.13 ha. The cropping pattern, however, has changed in the last decade. Prior to 1986, agriculture was for subsistence.

TABLE I
PATTERNS IN SOME INDICATORS OF
DEVELOPMENT OVER THE LAST 25 YEARS IN
THREE SAMPLED VILLAGES OF
KIBBER WILDLIFE SANCTUARY

| Indicator | 1971 | 1996 |
|---|------|------|
| No. of medical care centres | 1 | 1 |
| No. of post offices | 1 | 1 |
| No. of schools | 1 | 4 |
| Irrigated land (ha) | 83 | 91* |
| People per ha irrigated land | 4.2 | 4.1 |
| No. of villages with electricity | 0 | 3 |
| No. of villages connected by motorable road | 1 | 3 |

*in 1987

The main crops were barley and a local variety of pea (the latter largely for supplementing livestock feed), cultivated on two-thirds and one-third of the land holding respectively. Since 1986, however, one-third of the land holding is cultivated for green peas, one-third for barley, and the remaining is partly planted with local pea and partly left fallow. The entire harvest of green pea is sold as a cash crop. The estimated annual production of green pea per household is 2,587 kg, which translates into a per capita profit (corrected for transport costs) of US\$ 210 per year (1994-95 conversion rate of 1 US\$ = 31.4 Indian Rupees; World Bank 1996). The estimated annual production of barley per household is currently 1,294 kg.

This change in cropping pattern has significantly affected an age-old barter trade between the inhabitants of the study area and a semi-nomadic pastoral community, the *Changpa* of Ladakh. *Changpa* herders have been coming into Spiti for at least a few centuries (Kapadia 1996). They come in summer with their livestock (> 1,000 goat and sheep) when the high mountain passes (c. 5,600 m) become negotiable. The main trade involved barley, which earlier was in surplus, and was bartered with the *Changpa* largely in exchange for wool, salt and rugs. Owing to the replacement of barley with the commercially valuable green pea, and the resulting absence of surplus barley, the development of a market economy, and the improvement in transportation, communication, and supplies in Spiti, this trade is on the verge of breakdown. However, the trade continues for Spiti horses and donkeys, which are still in demand with the *Changpa*.

Livestock

The annual growth rate of livestock holdings in the study villages increased from 2.6% (between 1971 and 1987) to 3.5% after 1987 (up to 1996; Mishra 1997a). The growth rate of livestock throughout Spiti after 1987 was

3.2% (10,458 heads in 1988 to 11,881 heads in 1992). In the last 25 years, the ratio of livestock to human population in the study villages has increased from 1.85 (the year 1971, in Gete and Tashigang) to 2.80 (1996, in all three villages).

In terms of herd composition, Gete and Tashigang (data for Kibber for the year 1971 were not available) show an increase in all livestock species between 1971 and 1987, though the maximum increase was accounted for by goat and sheep (42%). After 1987, the number of donkeys and cow/*dzomo* declined, while the other species continued to increase (Table 2). In Kibber, the trend after 1987 was almost the same with all the species except cow/*dzomo* continuing to increase. Thus, in the last ten years, the population of cow/*dzomo* in all the sampled

TABLE 2
LIVESTOCK POPULATION TRENDS OVER 25 YEARS
IN THREE SAMPLED VILLAGES (DATA POOLED FOR
THE VILLAGES GETE AND TASHIGANG) OF
KIBBER WILDLIFE SANCTUARY

| Species | Gete and Tashigang | | | Kibber village* | |
|-------------------------|--------------------|------|------|-----------------|------|
| | 1971* | 1987 | 1996 | 1987 | 1996 |
| Yak | 9 | 14 | 29 | 28 | 110 |
| Cattle/ <i>dzomo</i> | 13 | 32 | 28 | 113 | 98 |
| Horse | 6 | 11 | 18 | 34 | 57 |
| Donkey | 11 | 17 | 11 | 93 | 114 |
| Sheep/ goat | 76 | 101 | 137 | 322 | 452 |
| Total | 115 | 175 | 223 | 590 | 831 |

*data for 1971 were not available

villages has declined marginally, while yak has increased more than threefold (Table 2). Goat and sheep again accounted for the maximum increase (57 %) during this period.

Tourism

Prior to 1992, foreign nationals were not allowed in Spiti, and even non-domicile Indians needed to obtain special permits from the State Government to enter the region. With the relaxation of Government policy since 1992, there has been a sudden growth in tourism.

Kibber, one of the study villages, had three functional hotels and one more under construction when this study was conducted, as opposed to none before 1993. These small hotels (3-4 rooms), catering to both Indian and foreign tourists, are run by local villagers. Many villages of Spiti now have makeshift hotels. The tourist inflow is restricted to between June and September. Between June and August 1996, a hotel owner reported a net profit of c. US\$ 637 (Chering Dorje, Kibber, *pers. comm.* 1996). Demand for local guides and donkeys by trekking tourists also causes a substantial inflow of money at the local level, which could not, however, be quantified.

DISCUSSION

Human population

Most habitat change and biodiversity loss in developing countries has been attributed to socio-economic change in growing rural populations (Machlis 1992). The Indian population, 74% of which is rural, has indeed grown at an annual rate of 2.17% in the past two decades, yielding a current density of close to 300 per sq. km (Repetto 1994). In contrast, the absolute human density of Spiti is very low (0.78 per sq. km). The unusual absence of population growth could largely be a consequence of the relatively intact system of primogenitary inheritance over most of Spiti (and polyandry in one region) where the younger siblings become celibate monks (Mamgain 1975, Punjab Government 1994). The stable population size seems to have stabilised the pressure for fuelwood on the protected area. However, it is important to keep in mind that most of the area in Spiti is uninhabited due to its inhospitable cold desert mountainous environment. Consequently, 31% of Spiti's present population is concentrated in and around the two protected areas, and is dependent on them for grazing and fuelwood (Pin Valley has a human population of 1500 inside

and around the National Park area; Mishra 1997b). A study estimates an annual per capita extraction of 217 kg of shrubs and dung (for fuel), and fodder (for winter supplemental feeding) by the resident population from Pin Valley (Bhatnagar 1996). It is also prudent to note that, faced with modernization, other trans-Himalayan Buddhist communities are undergoing rapid population growth following a breakdown of social population regulation mechanisms, and this might happen in Spiti as well (Goldstein 1981, Fox *et al.* 1994, Mishra and Humbert-Droz 1998).

Changes in agriculture and animal husbandry

The most significant socio-economic change in the region during the last decade has been the shift from a barter-based subsistence economy, to a market economy, resulting from, *inter alia*, changes in cropping pattern. The return per household from green pea harvest, the new cash crop, is almost as high as the average annual per capita income for Himachal Pradesh (US\$ 248, 1994-95; World Bank 1996).

Along with agriculture, there is indication of commercialisation of animal husbandry as well (livestock trade was earlier restricted to barter with the *Changpa*). This is evidenced in the three-fold increase of yaks in the last decade, which are now partly being raised in the villages of Kibber Wildlife Sanctuary for selling in other areas of Spiti (Chhewang D. Zangpo, Pin Valley, *pers. comm.* 1996). This contrasts with other yak rearing communities in the Himalaya, where the yak population is known to be declining rapidly (Negi and Gadgil 1997, J.L. Fox *pers. comm.* 1996). Between 1988 and 1992, the yak population of Spiti increased from 786 to 897 heads.

Livestock of the study villages graze in the Sanctuary area nearly throughout the year, though their diet is supplemented by stall feeding in winter. This supplemental forage is partly

collected during the growing season from the Sanctuary area, and partly from the cropfields. In addition, the State Government has initiated a scheme to provide supplemental feed at subsidised rates. Given the present trend and the augmented ability to purchase supplemental feed, livestock holdings are likely to continue growing in the near future. The increasing livestock stocking rate seems to be intensifying the pressure on the protected area resources for fodder.

Escalating livestock stocking rate is a countrywide phenomenon in India, the last two censuses indicating a 1.2% annual growth rate (419 million in 1982 to 445 million in 1987). With 67% wildlife sanctuaries and 83% national parks subject to livestock grazing (Kothari *et al.*, 1989), the urgency for evaluating the impacts of livestock on wildlife resources is obvious. In Kibber, the increase in stocking rate (together with poor anti-predatory livestock management) seems to be the main reason behind the recent escalation in instances of livestock depredation by large carnivores (the snow leopard and the wolf; Mishra 1997a). Even now, livestock outnumber bharal, the dominant wild ungulate and natural prey of the wild carnivores, by an order of magnitude. To reduce this depredation, villagers have been killing the wolf, and elsewhere, I have expressed concern that persecution of the snow leopard is likely to begin unless specific research and management measures are undertaken to understand and reduce this conflict (Mishra 1997a).

At a broader level, there is a need for assessing the impact of grazing on plant communities and evaluating the forage relations between livestock and wild herbivores. The potential for regulating livestock stocking rates and range use to enhance conservation objectives has long been recognised (e.g., Anderson and Scherzinger 1975, Willms *et al.* 1980), and such studies are a pre-requisite to designing effective multiple-use management policies for Indian protected areas.

Uncontrolled tourism

Uncontrolled tourism in wildlife reserves has usually resulted in conservation problems (Budowski 1976, deGroot 1983, Kenchington 1989). Kibber presently lacks even a record of the number of tourists visiting the Sanctuary. With the sudden development of tourism, the age-old trade route between Kibber and Ladakh (used by the *Changpa*; c. 125 km) has now become a popular trekking route. This route passes along wetlands in Ladakh that are important breeding sites for water birds, including rare and threatened species (Mishra and Humbert-Droz 1998). A rather conspicuous impact of this tourism has been the pollution of this route with discarded garbage (including non-degradable metal cans and polythene), especially around about 15 camping sites.

In addition, Kibber Wildlife Sanctuary, like some other regions of Spiti, has deposits of nautiloid, balamnite, and ammonite fossils (Y.V. Bhatnagar, *pers. comm.* 1997). Locals reported that fossils were being removed from the area even before Spiti was opened to tourists. However, this was confined to geologists and amateur collectors. Tourism has now created a market for fossils, which is causing a rapid depletion of the fossil reserves of Kibber Wildlife Sanctuary and elsewhere in Spiti. Depending upon its size and quality, a fossil may fetch US\$ 3 to US\$ 15. I could not, however, assess the magnitude of this trade. The need for a culturally and ecologically well designed tourism plan for Spiti is apparent, and has already been expressed (Kaushik 1993, 1994).

CONCLUSIONS

Spiti remained geographically as well as politically remote and isolated until 1992, and the so far intact social population regulation mechanisms have kept the local human population under control. However, a rapid socio-economic transition is in progress,

exemplified by improvements in transportation, increase in literacy, changes in cropping pattern (the adoption of a cash crop), breakdown of barter trade, expansion of livestock holdings, and a sudden development of an unplanned tourism industry. This is ultimately driven by far-reaching extrinsic factors such as the influence of commercial markets and changes in Government policy. The transition from a subsistence (barter-based) economy to a market economy, and changes in land use in Kibber Wildlife Sanctuary, have resulted in conservation problems such as the escalation of human-wildlife conflict (livestock depredation by wild carnivores), increased pressure on the protected area for fodder, pollution, and the depletion of fossil reserves. These have proximately been brought about by intrinsic (escalating livestock stocking rates) as well as extrinsic (tourism) factors.

This paper joins a growing body of literature documenting the significant influence of market forces even in relatively remote regions of the developing world (e.g. Goldstein 1981, Goldstein and Beall 1989, Fox *et al.* 1994, Negi and Gadgil 1997, Mishra and Humbert-Droz 1998). It further shows that the resultant

transition in socio-economy and landuse in local human communities can result in complex conservation problems. Conservation policies therefore, ought to bear in mind the transient nature of local human communities residing even in seemingly remote protected areas.

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